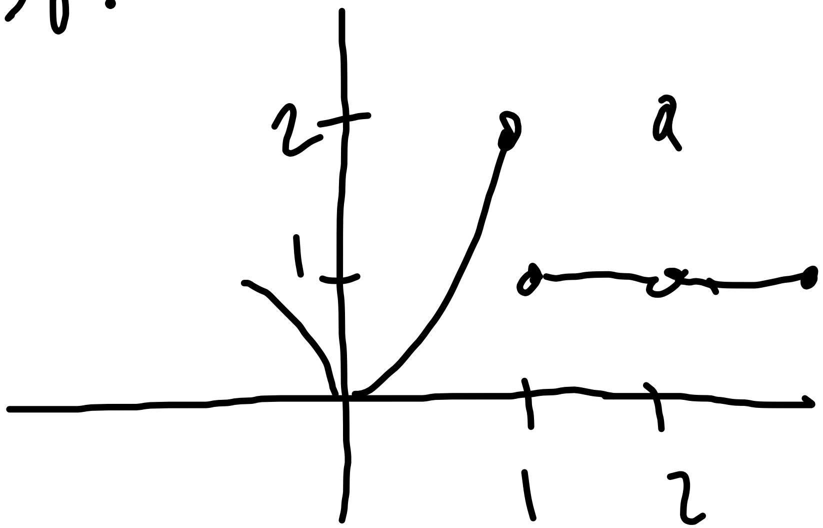
38.



$$\lim_{x \to 2} f(x) = 1$$

$$f(2) = 2$$

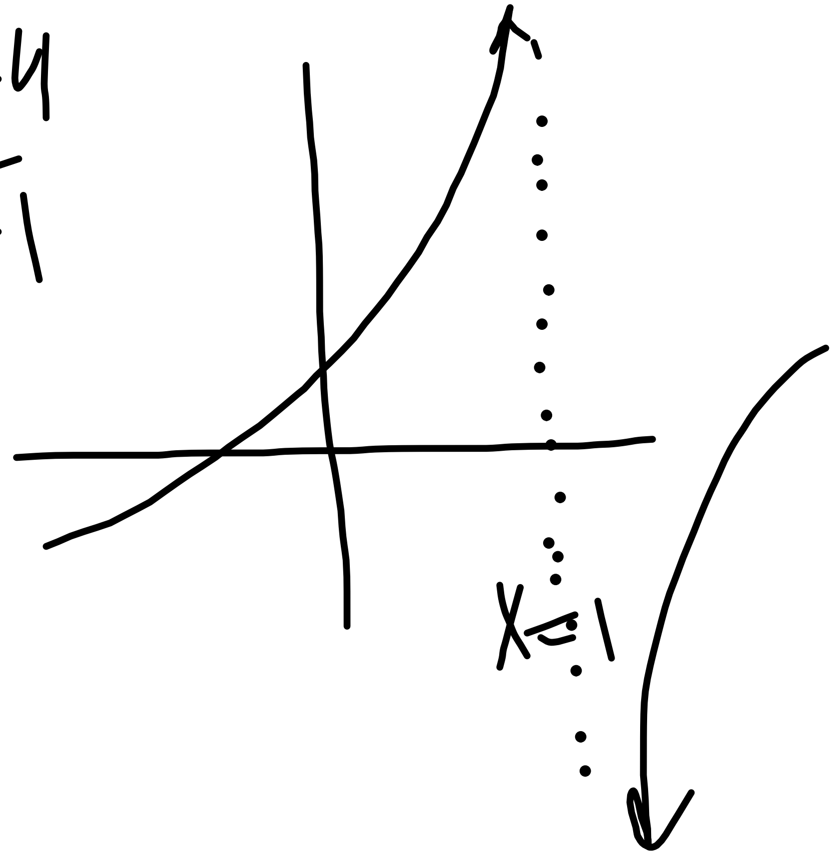
f) $\lim_{x \to 1} f(x) =$

$$\lim_{x \to 1^-} f(x) = 2$$

$$\lim_{x \to 1^+} f(x) = 1$$

$\lim_{x \to 1} f(x) =$ dne - reason - left $\neq$ right

29. $\lim\limits_{x \to 1} \dfrac{x^2-4}{x-1}$



$\lim\limits_{x \to 1^-} f(x) = \infty$

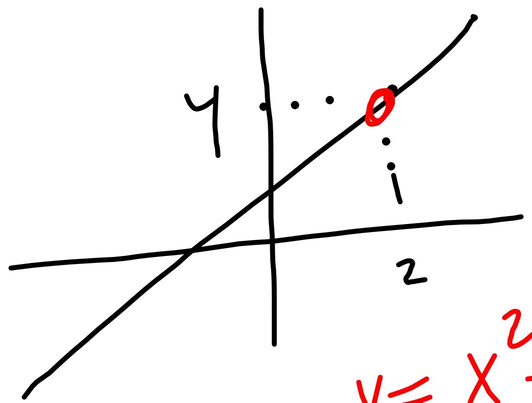
dne

$\lim\limits_{x \to 1^+} f(x) = -\infty$

$\lim\limits_{x \to 1} f(x)$ dne

$$\lim_{x\to 2}\frac{x^2-4}{x-2}=4$$

do graphically



$\frac{0}{0}$ let $x=2$

$$y=\frac{x^2-4}{x-2}$$

is a line with a hole

factor

$$\lim_{x\to 2}\frac{(x+2)\cancel{(x-2)}}{\cancel{x-2}}=4$$

$f(2)$ dne

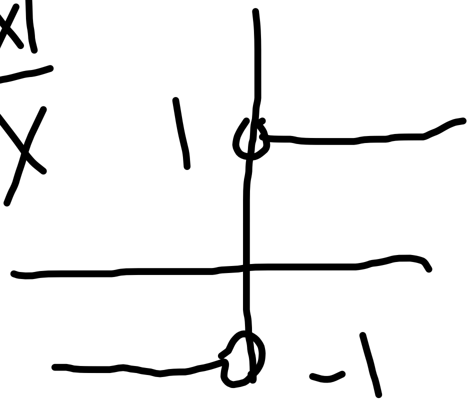
$$\lim_{x\to 2} f(x)=4$$

2.1 b more on limits

ways a limit fails to exist

1. left ≠ right $y = \frac{|x|}{x}$

$\lim_{x \to 0} f(x) = \text{dne}$

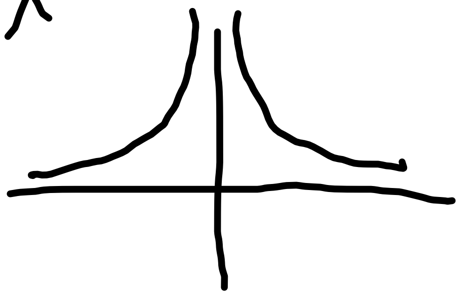


$\lim_{x \to 0^+} f(x) = 1$

$\lim_{x \to 0^-} f(x) = -1$

2. asymptotes

$\lim_{x \to 0} \frac{1}{x^2} = \infty \; (\text{dne})$



do graphically

3. $\lim_{x \to 0} \sin\left(\frac{1}{x}\right)$

diverges by oscillation

means limit does not exist

definition of limit, tolerances

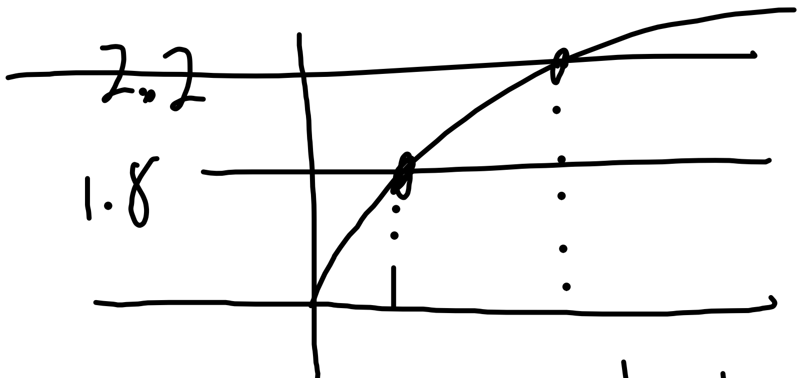
$$\lim_{x \to 4} \sqrt{x} = 2$$

when x is close to 4

y is close to 2

How close should x be to 4

so that $1.8 \le y \le 2.2$



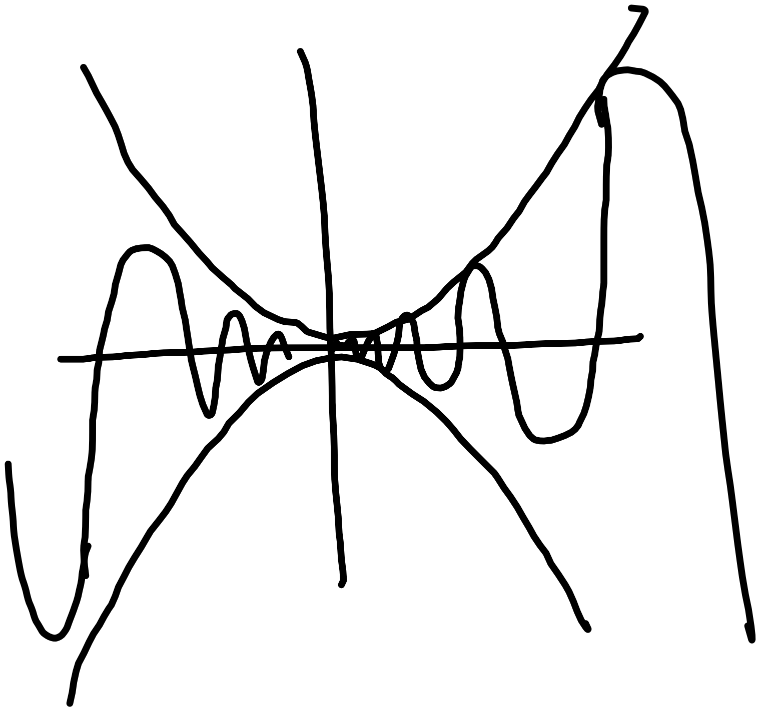
$f1 = \sqrt{x}$

$f2 = 1.8$

$f3 = 2.2$

action, coords & eq

$$\lim_{x \to 0} x^2 \sin\frac{1}{x} = 0$$ by the sandwich thm.



$$-1 \leq \sin\frac{1}{x} \leq 1$$

mult by x^2

$$-x^2 \leq x^2 \sin\frac{1}{x} \leq x^2$$